West Nile Surveillance in Utah

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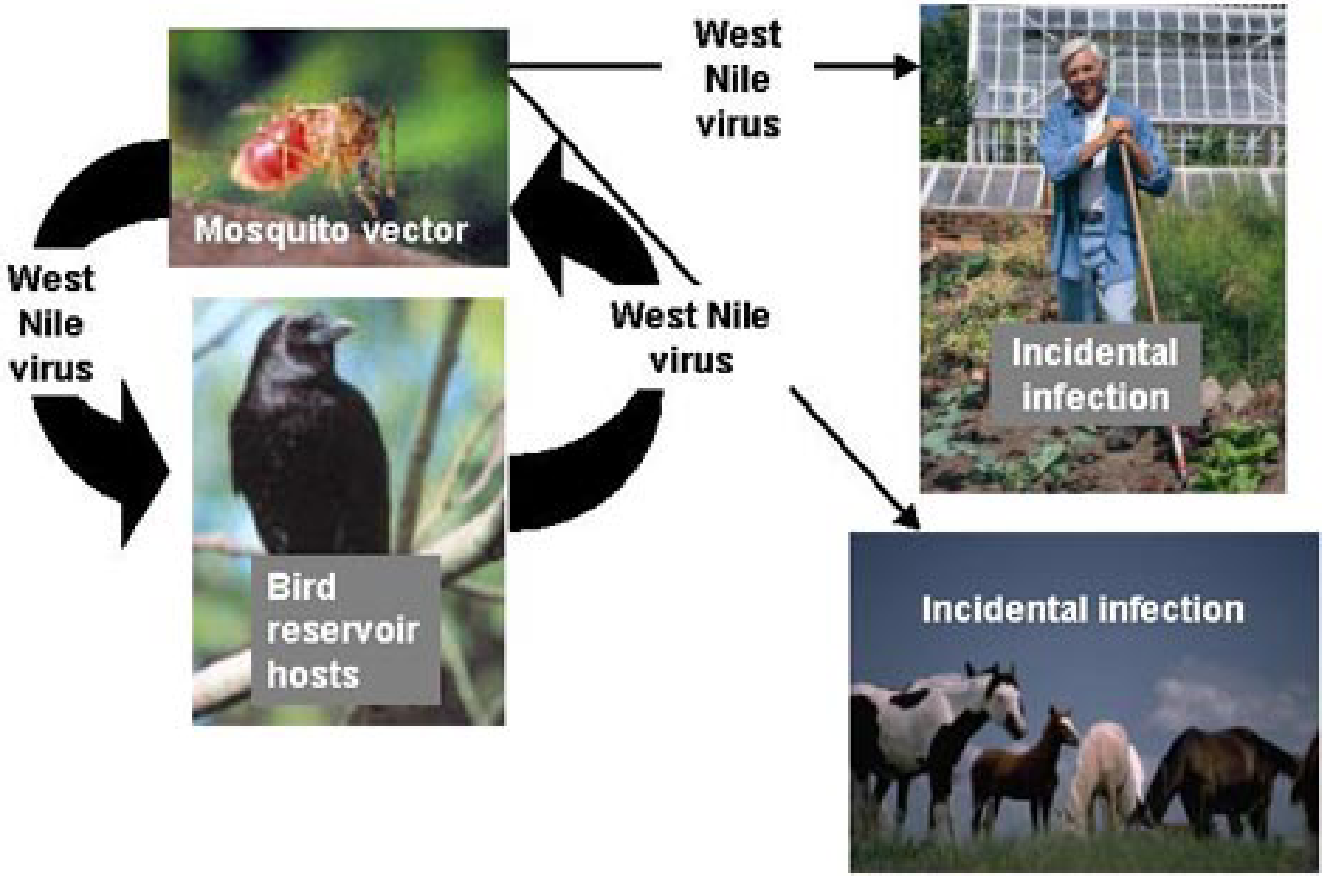
History of West Nile Virus

- 1937: West Nile virus isolated from woman with febrile illness in Uganda
- 1940s & 1950s: Human epidemics in Israel and Eqypt
- 1960s: Equine disease first noted (Egypt and France)
- Next decades: Geographic distribution spread to include Africa, southern and southeastern Europe, Middle East, and southern Asia

West Nile Virus Transmission Cycle



Typical Life Cycle

- Wild birds are the principle reservoir
  - Historically, birds not typically harmed by virus
    - 162 + species died from WNV (since 1999)
  - Viremia persists up to 14 days in some species
- Bird to bird: bird-feeding mosquitoes and bird-feeding ticks
- Accidental or dead end hosts: mosquito bite
  - Humans, horses
  - other mammals (rarely symptomatic)

Experience in the U.S.

- 1999 – New York City
  - June: Vets found birds ill and dying of CNS disease
  - August: Infectious disease physicians noticed unusual cases of encephalitis/muscle weakness
  - September 27, 1999: WNV confirmed as cause of illness in both humans and birds

1999 Summary

- 62 human cases
  - 7 deaths
  - 1.2-4.1% positive (seroprevalence study)
- 25 horse cases
  - 9 deaths (36% fatality)
  - 29% stablemates seropositive
- Other mammals: cats?

2000 Summary

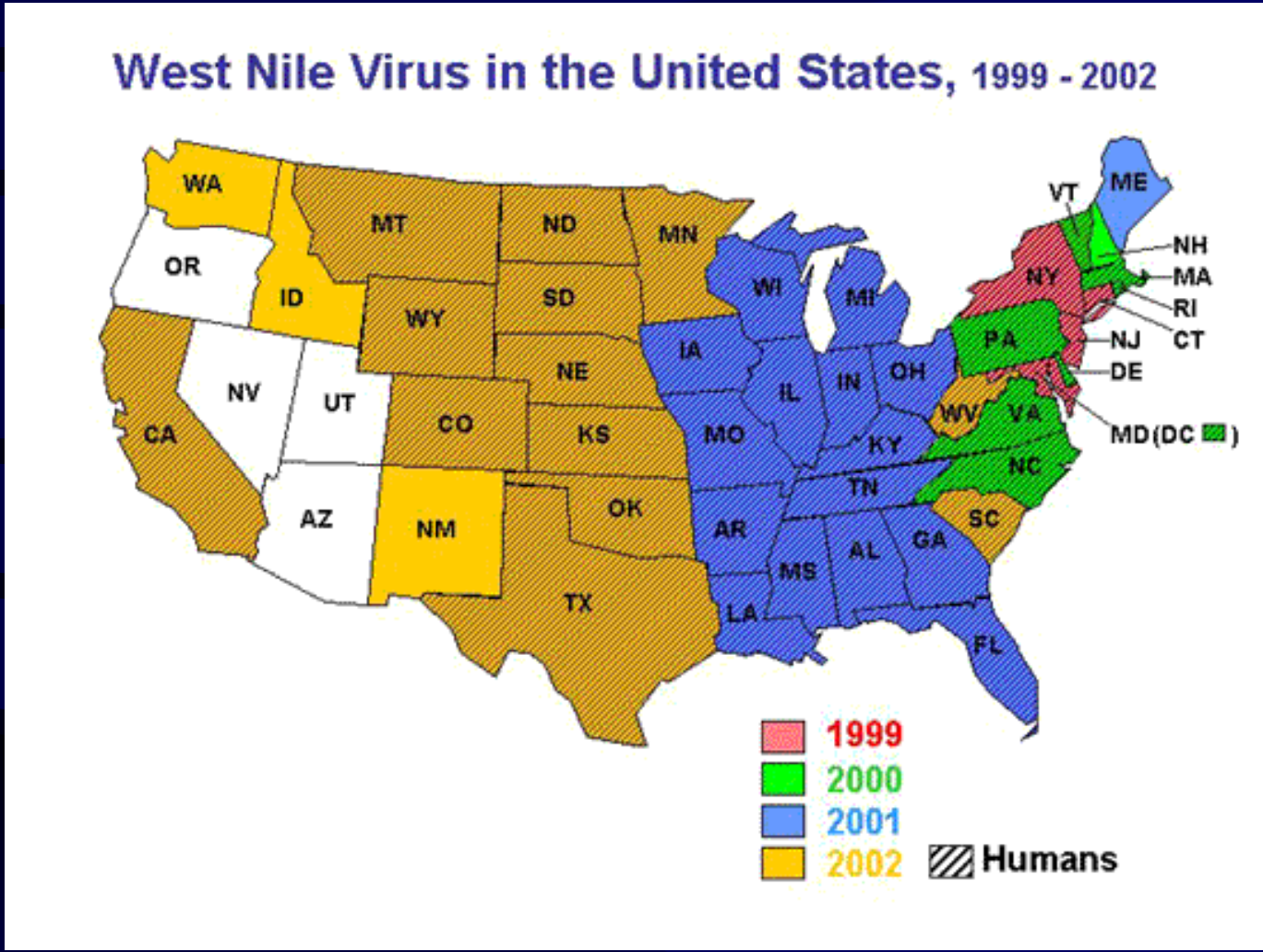
- Spread to 12 states: NY, NJ, MA, CT, RI, DE, VT, VA, MA, PA, NC, NH
- 21 Human cases
  - 1 death
  - 0-0.46% seropositive
- 63 horse cases (7 states)
  - 23 deaths (38% fatality)

2001 Summary

- Continued spread to include most states east of the Mississippi River
- 66 human cases
  - 9 deaths
- 738 cases in horses (20 states)
  - 156 deaths

2002 Summary

- 4,008 human cases
  - 2,741 WNME (West Nile meningoencephalitis)
  - 1,267 WNF (West Nile fever)
  - 263 deaths (median age 78)
- 14,901 cases in horses
  - 30% fatality rate
- 15,745 positive birds (162+ species)
- 6,033 positive mosquito pools (29 species)


West Nile Virus in the United States, 1999 - 2002
WA
OR
CA
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SC
NC
VA
PA
NY
VT
ME
NH
MA
RI
CT
NJ
DE
MD (DC)
1999
2000
2001
2002
Humans

Numbers update for 2002

- States where West Nile Virus (WNV) transmission has NOT been identified* *(except in travelers)
  - Arizona, Utah, Oregon, Nevada, Hawaii and Alaska
  - California – 1 human – transmission mode unknown (August)
  - Washington – 2 dead birds (October), 1 horse (October)
  - Idaho – 1 horse (October)

Western states'WNV experience is different than Eastern states'

- SD and WA – similar pattern to eastern states with dead birds being recognized first
- CO and NE – horses at same time as dead birds
- MT, NM, WY, KS, ND and ID – horses before dead birds
- Why?
  - Lower density and visibility of wild birds?
  - Higher density and visibility of horses?

National Conference Update

- Predictions:
  - Endemic areas will have activity in 2003
  - Horses – indicator species in western states
- CDC's Human surveillance goals:
  - Distinguish clinical syndromes (encephalitis, meningitis, meningoencephalitis, acute flaccid paralysis)
  - Identify new modes of transmission

5 New Modes of Transmission

- Transplantation
  - Report symptomatic patients to CDC up to 4 weeks after organ transplant
- Transfusion
  - Defer unsuitable donors (symptomatic), report post-donation illness, withdraw & quarantine blood products, implement screening
- Transplacental
  - Infection screening not recommended, test symptomatic patients, recommend personal protection for pregnant women
- Breast-feeding
- Occupationally-acquired illness
  - Goals: estimate incidence and define risky activities

National Conference Update

- Emerging clinical syndromes:
  - Movement disorders, parkinsonism, acute flaccid paralysis, rhabdomyolysis, etc.
- Outcome data
  - 10% fatality in those with CNS disease
    - Elderly and Immunosuppressed
  - Long-term sequelae: persistent/chronic headache, concentration & memory problems, fatigue, movement disorders
    - NYC study found 50% enrolled had sequelae in cognition, functioning and physical status
    - 30% self-reported fully recovered

Arboviral surveillance in Utah

- Western Equine Encephalitis (WEE), St. Louis Encephalitis (SLE), and WNV
- Old - Sentinel chickens, humans, horses (WEE)
- New - Mosquitoes, dead birds
- WEE and SLE activity in Utah is sporadic
  - Most recent outbreak of WEE in 60 horses in 1978
  - Largest human outbreak of WEE in humans in 1958 (48 humans, 244 horses)

Surveillance in 2003

- Mosquitoes
  - Mosquito abatement districts (MADs) collect; testing at UDOH lab
- Sentinel chicken flocks
  - MADs do bleeds; testing at UDOH lab
- Equines
  - Veterinarians collect samples; testing done by Utah Veterinary Diagnostic Laboratory (UVDL)
- Dead birds
  - Testing at UDOH lab; others??
- Humans
  - Testing available at UDOH lab or other reference labs (for fee)

Risk to other animals?

- Possible in areas with high levels of activity BUT:
- Hundreds of thousands of dead birds
- Thousands of infected horses
- Thousands of infected humans
- A few dogs, one wolf pup
- One flock of sheep and mountain goats
- Three gray squirrels
- Others

Dead Bird Surveillance 2003

- Triage
  - Corvids and raptors
    - Other species on individual basis
  - Timing
    - May 15 through October 31
  - Freshly dead (<24 hrs)
- Collection of birds
  - Special salvage permits (state and federal)
    - Will allow LHDs and MADs to collect and transport dead birds for surveillance purposes
  - Oral swabs
  - Reporting form

Dead Bird Surveillance cont.

- Public notification
  - Need birds cooled as soon as possible
  - Once WNV is identified in an area, limited additional testing according to resources and need (but will document information on all birds)
  - Remote areas: recognition and shipping of dead birds
- Notification of results
  - Through local health department

Human Surveillance

- Reportable under Communicable Disease Rule (as either encephalitis or meningitis)
- Contacted all hospital infectious disease nurses in August/September 2002; distributed informational materials through multiple channels
- Tests submitted to private reference labs and CDC
- All negative except person with history of travel to Virginia in July 2002

Human Surveillance 2003

- Enhanced contact with infectious control nurses, physicians, and neurologists
  - Weekly phone calls to hospitals during July-October
  - Continued dissemination of information through LHDs and the listserve
- Testing available at Utah Public Health Laboratory
- Encourage testing for agents besides WNV

Clinical Suspicion

- West Nile Virus should be considered:
  - Older adults (can be among all ages)
  - Onset of unexplained meningitis or encephalitis
  - Especially in late summer and early fall (can be year round)
  - Local enzootic activity or other human cases will further raise the index of suspicion

Communication of Results

- www.health.utah.gov/els/epidemiology/wnv
- West Nile Virus listserv
  - Weekly updates on WNV activity
  - Testing results (chicken, mosquito, horse, bird)
  - Alerts about activity in neighboring states
  - Email mkorth@utah.gov to join

Prevention

- Mosquito Control
  - Mosquito Abatement role
    - Integrated pest management – source reduction, larvae and adult control
  - Individual responsibility
    - Source reduction at homes, businesses, etc.
    - Checking screens/windows, etc.
    - Personal protection: DEET-containing repellents, long sleeves/pants, avoidance of mosquitoes at dusk/dawn

Summary

- WNV activity in Utah in 2003 is inevitable
- Horses most likely to be first recognized species and experience greatest impact in terms of numbers
- Dead bird surveillance important but challenging, especially in remote areas
- No vaccine, no treatment, PREVENTION is KEY
- Need to emphasize personal protection to public but would anticipate few human cases
- Public response likely to surpass actual risk

Collaborators

- Utah Mosquito Abatement Association and local MADs
- Local Health Departments
- Utah Dept of Agriculture and Food
- Utah Dept of Natural Resources
- CDC and other federal agencies
- Zoos, aviaries
- Health care providers, veterinarians

Web Resources

- Utah Department of Health
  - www.health.utah.gov - go to WNV page
- Centers for Disease Control and Prevention
  - www.cdc.gov - go to WNV page
- Cornell University's Environmental Risk Analysis Program:
  - www.cfe.cornell.edu/erap/WNV